View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by Online Research Database In Technology

Technical University of Denmark

Plasmonics light modulators

Babicheva, Viktoriia; Malureanu, Radu; Lavrinenko, Andrei

Publication date:
2013

Link back to DTU Orbit

Citation (APA):
Babicheva, V., Malureanu, R., & Lavrinenko, A. (2013). Plasmonics light modulators. Abstract from 15th Photonics North Conference, Ottawa , Canada.

DTU Library
Technical Information Center of Denmark

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Plasmonics light modulators

Viktoriia E. Babicheva[1], Radu Malureanu[1], Andrei V. Lavrinenko[1]

[1]Department of Photonics Engineering, Technical University of Denmark, Kgs. Lyngby, Denmark

Surface plasmon polaritons (SPPs) are waves propagating at the interface between a metal and a dielectric and, due to their tight confinement, may be used for nanoscale control of the light propagation. Thus, photonic integrated circuits can benefit from devices using SPPs because of their highly compact and fast response time characteristics.

In this talk we will present plasmonic modulators with sandwich geometry where the sides are composed of thin metallic layers while the center is an active material with controlled gain coefficient (see figure). In particular, we analyse InGaAsP-based active core. Using such geometry we can obtain high modulation speed, low footprint and high modulation depth. We discuss the dependence of the waveguide core size and gain for different thicknesses of the metallic layers. Due to the finite and small thickness of these layers, several coupled modes can be obtained. We chose only one of these modes to study since calculations showed it is the one allowing for the highest modulation depth while the gain levels needed in order to obtain loss compensation are still within practical reach.

Various possibilities for defining the field confinement are discussed as well as relative effective index, absorption coefficient and extinction ratio of the modulator. The differences between the 2D and 3D cases are also succinctly described.